

Iridium

Ir

General Information

Discovery

Iridium was discovered by S. Tennant in 1803 in London.

Appearance

Iridium is a hard, lustrous, platinum-like metal.

Source

Iridium occurs uncombined in nature in alluvial deposits, and is recovered commercially as a by-product of nickel refining.

Uses

Iridium is used principally as a hardening agent for platinum. It also forms an alloy with osmium which is used for pen tips and compass bearings. It is the most corrosion-resistant material known, and was used in making the standard metre bar, which is an alloy of 90% platinum and 10% iridium.

Biological Role

Iridium has no known biological role, and has low toxicity.

Physical Information

Atomic Number	77
Relative Atomic Mass ($^{12}\text{C}=12.000$)	192.2
Melting Point/K	2683
Boiling Point/K	4403
Density/kg m ⁻³	22560 (290K)
Ground State Electron Configuration	[Xe]4f ¹⁴ 5d ⁷ 6s ²
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	190

Key Isotopes

Nuclide	¹⁹¹ Ir	¹⁹² Ir	¹⁹³ Ir
Atomic mass	190.96		192.96
Natural abundance	37.3%	0%	62.7%
Half-life	stable	74.2 days	stable

Ionisation Energies/kJ mol⁻¹

M - M ⁺	880
M ⁺ - M ²⁺	1680
M ²⁺ - M ³⁺	2600
M ³⁺ - M ⁴⁺	3800
M ⁴⁺ - M ⁵⁺	5500
M ⁵⁺ - M ⁶⁺	6900
M ⁶⁺ - M ⁷⁺	8500
M ⁷⁺ - M ⁸⁺	10000
M ⁸⁺ - M ⁹⁺	11700
M ⁹⁺ - M ¹⁰⁺	

Other Information

Enthalpy of Fusion/kJ mol⁻¹ 26.4

Enthalpy of Vaporisation/kJ mol⁻¹ 612.1

Oxidation States

Main Ir^{III}, Ir^{IV}

Others Ir^{-I}, Ir^O, Ir^I, Ir^{II}, Ir^V, Ir^{VI}

Covalent Bonds/kJ mol⁻¹

Not applicable